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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/593,783

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Toru Torii

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ALEXANDRIA, VA 22314

EXAMINER

HAIDER, SAIRA BANO

ART UNIT

PAPER NUMBER

1765

NOTIFICATION DATE

DELIVERY MODE

06/23/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/593,783	Applicant(s) TORII ET AL.	
	Examiner SAIRA B. HAIDER	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05/04/2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9, 12, 14, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9, 12, 14, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 05/04/2011 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 19 and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Independent claims 19 and 20 recite “superfine satellite microdroplet(s)” in various parts of the claims. However the specification fails to provide support for this newly added limitation. Applicants’ specification merely provides support for “fine satellite droplets” and “satellite droplets” that are “very fine” ([0063, 0075, 0076] of PG PUB of herein application). Thus applicants have support for “very fine satellite droplets” or “fine satellite droplets.” Applicants do not have support for the claimed “superfine satellite microdroplet(s).”

Claim Rejections - 35 USC § 102

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4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claim 19 is rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al. (US 7,595,195).

6. Lee discloses microfluidic devices for the formation of droplets, wherein the device forms micro- and nano-scale droplets and sorts them (abstract). Specifically, Lee discloses a microfluidic device wherein droplets are generated and the droplets of difference sizes are sorted (col. 10, ln. 13 to col. 11, ln. 10). Lee discloses that satellite droplets 281 can be separated from larger droplets 284 as shown in FIGS. 21A-22C. Satellite droplets 281 of less than 1 .mu.m in diameter can be generated, separated and then collected in the microchannel without using surfactants. Large and small satellite droplets are first generated in the microchannel (FIG. 21A). The arrow indicates the direction of flow and the dash circles indicate the presence of a satellite droplet 281. Satellite droplets 281 are carried by the flow into the upper channel 288, while large droplets 284 are pulled by shear and pressure forces into the lower channel 285 (FIG. 21B). Only satellite droplets 281 are observed in the collecting zone 289 for the upper channels 288 (FIG. 21C). (col. 10, ln. 64 to col. 11, ln. 10).

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US 7,595,195).

9. Lee applies as discussed above, but fails to disclose the claimed second satellite and second primary droplets. However, Lee notes the droplet formation process involves programmable control of size and composition of the droplets (col. 3, lines 49-62). It would have been obvious to one of ordinary skill in the art at the time of the invention to include a second set of droplets (and the corresponding second satellite droplets) which are different from the primary droplets (and satellite droplets) in order to produce a mixture of the microdroplets and a mixture of the satellite droplets. Wherein it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the satellite droplet sorting mechanism of Lee in order to separate the satellite droplets of less than 1 micron from the larger primary and secondary microdroplets.

10. Claim 9, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quake (US 2002/0058332) in view of Chow et al. (US 6,149,787).

11. Quake discloses an embodiment wherein a first droplet extrusion region may introduce droplets of a first sample into a flow of fluid (e.g., oil) in the main channel and a second droplet extrusion may introduce droplets of a second sample into the flow of the fluid in the main channel and so forth [0019]. Wherein the first droplet extrusion region reads on the claimed first dispersion phase supply channel, the flow of fluid in the main channel reads on the claimed first continuous phase supply channel, and the second droplet extrusion region reads on the claimed second dispersion phase supply channel.

12. In reference to the claimed control of the phases as per claims 9, 12, and 14, Quake notes that the introduction of the droplets through the different extrusion regions may be controlled

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[0119]. Wherein Quake describes the control mechanism, stating that by controlling the pressure differences between the oil and water sources at the droplet extrusion region, the size and the periodicity of the droplets generated may be regulated [0115]. Quake further notes alternatively, a valve may be placed at or coincident to either the droplet extrusion region or the sample inlet connected thereto to control the flow of solution into the droplet extrusion region, thereby controlled the size and the periodicity of the droplets [0115]. Hence Quake discloses the claimed control devices connected to the first and second dispersion phases and notes the control of the periodicity of the respective droplets.

13. In reference to the claimed intersection of the channels, Quake describes the intersection of the first dispersion phase into the main channel (the continuous phase) and the intersection of the second dispersion phase into the main channel (the continuous phase). Wherein B shows the T-junction intersection of the main channel(continuous phase), the first phase and the second phase [0292]. However, Quake does not explicitly disclose a cross intersection. Thus attention is directed towards the Chow reference is drawn to microfluidic devices (abstract). Chow teaches that a basic cross channel structure is beneficial because it allows for controlled transport through the intersection and provides constraining flows from the other channels at the intersection (col. 10, ln. 45-64). Wherein it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a cross channel structure, instead of the T-junction structure, in the invention of Quake in order to exert greater control on the flow of the fluids through the channels. Specifically, it would have been obvious to employ a horizontal channel as the main channel, consistent with Quake, and the vertical channels as the first and second dispersion phases that are present across from one another and perpendicular to the horizontal channel to form the cross-intersection.

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14. In reference to the claimed sequential production of the droplets as per claims 9, 12, 13, Quake notes that the introduction of the droplets may be controlled, so that for example the droplets combine (allowing, for example the enzyme to catalyze a chemical reaction of the substrate) [0115]. It would have been obvious to one of ordinary skill in the art at the time of the invention to alternate the flows of the first and second dispersion droplets present in the cross-intersection channels so as to allow for the production of droplets that can combine down stream to the cross-intersection. The motivation for such combination is to prevent the droplets from reacting at the cross-intersection and thus preventing the back-diffusion of the reacted product and thus prevent the disruption of the creation of the droplets from the channels.

Response to Arguments

15. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAIRA B. HAIDER whose telephone number is (571)272-3553. The examiner can normally be reached on Monday-Friday from 10am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JAMES J. SEIDLECK/
Supervisory Patent Examiner, Art Unit 1765

SAIRA B HAIDER
Examiner
Art Unit 1765